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gratis.

DESCRIPTION

Of the Great

BURNING-GLASS

Made by

Mr. VILLETTE and his Two Sons,

Born at *LYONS.*

With some Remarks upon the surprising and wonderful Effects thereof.

L O N D O N :

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DESCRIPTION

OF THE

Great Burning-Glass

Made by

Mr. VILLETTE and his Two Sons.



T may safely be affirmed that this Burning-glass is the most perfect in its kind, that has ever been made. It is of a circular Figure, has almost Forty seven Inches in Diameter, an Hundred and forty six in Circumference, and weighs almost Four hundred Pounds. It is made of a Com-

A 2

pound

pound Metal, invented purposely for this Intent. Its Surface is Spherical, and makes a part of a great Globe; it has two Surfaces, the one Convex, the other Concave, both neatly polished, and each has its proper Effects whereby they differ no less than by their Figure.

It rests upon a threefold Basis of Steel curiously graven, and so artificially wrought, that it may pass for a Master piece in its kind. It is so conveniently contriv'd, that tho' the whole weigh nigh Six hundred Pounds, yet one Person alone may easily turn it any way and move it about a Room, and with one Hand may place the Burning-glass either Vertically, or Horizontally, or in any declining Situation.

Burning is its chief Effect, whence it takes the Name of *Burning-glass*. The Effect is caused when the Concave Surface is pointed directly against the Sun so as to correspond exactly to its Elevation. For then it reflects back the Rays that fall upon the Surface, and unites them all together in the Focus which is in the Air three Foot and six Inches distant from the Burning-glass, all which is done by Reflection, and not

by Refraction, as in other ordinary Burning-glasses thro' which the Rays of the Sun must pass before they concenter, which takes off considerably from their Force, so that where the Burning is caused by Reflection, the Heat and Activity is more Intense.

The Rays of the Sun which fall upon this Mirror are all re-united in a circular Space of less than half an Inch Diameter, which being about Nine Thousand times less than the Surface of the Mirror, makes the Heat in that Space or *Focus* so to encrease as to exceed the common Heat of the Sun in that Proportion. There that Union of Rays not only dazzles the Sight by its strong Reflections as if one look'd at the Sun; but there all combustible Matter is burn'd in an Instant.

A green Bough of a Tree applied to this burning *Focus*, immediately takes Fire and flames, and if it be mov'd up and down, whatever part of it is actually in the *Focus* always Flames, and no other; for the Force of Burning is all reduced to that Point, from which if the Stick be remov'd either by drawing it nearer to the Burning-Mirror, or further

ther off, the Flame extends its self, and the larger it grows, the more the Heat diminishes; so that the Light five or six Inches off from the *Focus* becomes as broad as one's Hand, and the Heat at that distance is not more than the Hand can bear; whereas if it were put in the *Focus*, it would immediately flame like a Candle, or like a piece of Wood; whence it manifestly appears that this extraordinary Force and Activity proceeds from the close Union of so many Rays, which combining all their Forces in one Point, produce there a Heat far surpassing that of the hottest Furnaces in the World, and which in less than a Minute melts Lead, Pewter, Brass, Gold, Silver, Steel, and generally all Sorts of Metals and Minerals.

But how quick soever this Heat is in liquefying these Metals this does not sufficiently give us to understand the Intensity thereof; 'tis by the Effects of Vitrification that we may better judge of its Violence. It immediately vitrifies Slate, Tiles, Bricks, Potter's Earth, Morter, Sand, Crucible, all Sorts of Bones, Marble, Jasper, Porphyry, and universally all kinds of Stones; which
being

being vitrified in an Instant, will also in a very short time melt, and fall to the Ground, drop by drop. The same has been experienced in other Bodies that are the best temper'd against Fire, and resist it for whole Years when most violent, as the Bottoms of Furnaces where Iron Oar is melted, upon which the Burning-glass works immediately, and soon dissolves, and makes them drop into Glass, which shews the vast Difference between this Celestial Fire, and our culinary Fire, since that does more in one Minute than the greatest and most violent Fires of the Earth can do in a whole Year. Nay the Cloth made of the *Asbestos* or incombustible Stone (as they call it) which common Fire only cleans, is by this Heat melted down and vitrified.

It must not be wondered at, that the Stones which are so hard may be vitrified, since there is nothing that we know upon the Face of the Earth which by means of extraordinary Heat is not reducible to Glass, nay, this is the utmost effect of Fire, and the last Quality that sublunary Bodies can acquire: and when Chymists are come to the Vitrification

of their Compounds; they are then non-pluss'd, and may e'en leave off all further Experiments, it being impossible for vitrified Substances to change their State by their Fires.

Some have imagined that the Rays were united in the middle of the Burning-glass, and that all its Activity came thence. But this is evidently false, for if not only the Center, but also the greatest part of the Concave Surface be covered, so that a Circle round the Burning-glass, or only three or four different Parts remain expos'd to the Sun, all the Rays that fall upon the uncovered Parts will Concenter in the *Focus*, and burn, tho' not with equal Violence, because fewer Rays will be united.

Some likewise there are who imagine that the Burning-glass must have more force in Summer than in Winter, but Experience proves the contrary; for it has been exposed to the Sun for two whole Hours on a hot Summer's-day, and was very much heated, as a Stone, or other solid Body would be; but it was observ'd that the more it was heated, the less force it had to burn. The reason of this difference may be, that
Cold

Cold condenses Bodies, and Heat dilates them, and a Body that is condensed reflects the Rays of the Sun much better than when it is rarified. Besides, the Sun being longer over our Horizon in Summer, and its Rays falling more direct, more Vapours and Exhalations are drawn up from the Earth, and consequently the Air cannot be so clear and purified as in Winter. Besides, when it is fair, the Sun in Winter must have more force because it is nearer to us by several thousand Leagues; as is demonstrated by the Astronomers, who find its apparent Diameter larger in Winter than in Summer.

Here is another Question, not unworthy to be discuss'd by the Learned. Some have been of Opinion, that the Burning-glass expos'd to the Moon would cause Heat, according to the Doctrine of those Philosophers who teach that there is no Light without Heat; others on the contrary held that it would produce Cold. To solve the doubt, the Burning-glass was expos'd to the full Moon on a clear Night, the Rays united together, and concentr'd in the *Focus* like those of the Sun; but

but not the least Heat being perceived, a great Thermometer, of a sort the most susceptible of the least Motion of either heat, or cold, was brought, and the Ball being put in the *Focus* continued there for two Hours, without any rising or falling of the Liquor; which proves evidently that that Planet yields neither Heat nor Cold. But what is most surprizing, is, that the Rays of the Sun receiv'd upon a Looking-glass of a competent Size, and thence reflected upon the Concave Surface of the Burning-glass, tho' at a considerable Distance, will reunite and produce a Heat not much inferiour to that of the direct Rays falling immediately upon the Burning-glass, and yet the same Rays of the Sun reflected from the Moon have not the least Effect.

We might here enlarge upon several other Experiments, which have been made, and may at any time be renew'd; as for Example, the Mixture which is commonly us'd for making of artificial or false Jewels, being dissolved by the heat of this Burning-glass acquires a Beauty and Hardness far greater than what can be communicated by means of ordinary Fire. But

But for Brevity's sake, omitting these and other Observations, we will only mention some Effects that the Burning-glass has without being expos'd to the Sun, which are Curiosities belonging to Catoptricks.

Besides the Property of Burning, it is very pleasant to see the different Representations that the Burning-glass exhibits, and which by their Variety cause no less Satisfaction than Admiration. The nearer an Object is to it, the farther off the Image appears. It sometimes represents the Image perfectly like unto its Object, and sometimes quite different. In a certain Situation the Object is seen straight up, and then being a little mov'd, the Glass immediately shews it inverted. Sometimes the Image seems within the Glass, other-times upon the Surface, and sometimes without, and even farther off than the Object its self; which may be seen in a very diverting Experiment. Let a Man stand about fifteen or twenty Foot off, and point a Stick towards a certain part of the Burning-glass, the Stick and Arm that holds it will seem to push forth from the Glass and advance up to the Person that

that holds it; and if he stretches his Arm a little farther, it will pass quite across him, and seem to some of the Standers-by to run full into their Eyes, so that they will not be able to forbear starting back. This Effect is something extraordinary, for other Looking-glasses shew the Image as far within the Glass, as the Object is distant from it, but this represents it quite without the Glass, and that so distinctly, that if you hold out your Hand, you will see another between you and the Glass, coming to shake Hands with you, which cannot but be a very surprising, and not less diverting Sight.

Sometimes a Man is represented with two Chins, two Mouths, two Noses, and three Eyes, and sometimes only one in the Middle of his Forehead; and all these Representations may be seen either upright or inverted, according to different Situations. Sometimes a very tall Man appears not above a Foot high, and yet is shewn in his full Breadth and Thickness.

If the Burning-glass be placed horizontally, it represents the Objects round about in very surprising Postures. A
Face

Face will appear five Foot broad, and not exceed its true length, or on the contrary will be prodigiously encreased in height, and not be the least altered as to its natural breadth. In fine, there are as many different Representations, as there are different Situations, and consequently are too numerous for each to be mention'd.

When it is turn'd towards a Field or Garden, it represents all Things so naturally, that the Field or Garden seems to be within the Room, and one may see all the Objects either in their natural Situation, or inverted, according as one stands nearer or farther off from the Burning-glass; and if there be People walking or dancing in the Garden, they may be seen walking or dancing upon their Heads.

As the Glass sends to the *Focus* all the Rays of Light that it receives; so the *Focus* reflects back upon the Glass the Species of whatever is applied to it. So that if a Torch be put in the *Focus*, it immediately shines like a Sun upon the whole Surface of the Burning-glass, and illuminates it in such a manner that it looks like a Globe of Fire, and casts its light so far, that one may easily read thereby

thereby in a dark Night above four or five hundred Paces off.

The Convex Surface recreates the Sight with admirable Contractions of Objects, which the farther they are off, the more they are diminish'd; and with curious Perspectives, representing at once a great variety of People, and Land-scapes.

Monfieur *VILLETTE* undertook to make this Burning-glass, encourag'd by the good Success he had in a former Work of the same kind. Having made one at *Lyons* of 34 Inches Diameter, in the Year 1670, he receiv'd Orders from the King to bring it to *St. Germans*, where his Majesty saw it, and was so much taken with it, that he was pleas'd to order him a Reward of an Hundred Pistoles for the Sight, and then had it bought, and plac'd in the Observatory at *Paris*, where it is still remaining.

Monfieur *VILLETTE* returning to *Lyons*, resolv'd some Years after, with the help of his two Sons, to make another, as much larger than the former, as Art and Industry would permit. And they had the good luck to succeed perfectly well in one of near 47 *English* Inches

Inches Diameter, which is the Subject of the present Description, and which, after long and tedious Labour, and extraordinary Expences, having been brought to Perfection, may now truly be said to be the most accomplish'd work of this Nature that is extant.

The said burning Mirror is now in Possession of Monsieur *Villette* the Son, Engineer, Mechanick, and Optician to his Electoral Highness of *Cologne*, Bishop and Prince of *Liege*, where the said *Villette* commonly resides.

At the Desire of several learned Men, he has brought it to *London*, and shews its surprising Effects in *Privy-Garden*, *White-Hall*, in a Place which his *Britannick* Majesty has allow'd him to make use of for that Purpose.

Those that desire to see the several Experiments made with it, may go at any Time, provided it be fair Weather, and the Sun be clear.

F I N I S.

